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BONNEVILLE SALT CRUST STUDY

Prepared for

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Conclusions

1. There has been no permanent increase or decrease in the area covered by the Bonneville salt crust during the past 51 years.
2. Minor redistribution of the salt crust has caused disruption of the crust near the north lease ditch. The disruption extends a maximum of one-half mile from the ditch.
3. There has been no significant change in potassium chloride concentration in the brine north of Interstate 80 between 1967 and 1977.
4. North of Interstate80, significant changes in magnesium chloride concentrations in the brine between 1967 and 1977 are confined to an area adjacent to the north lease ditch and a small area within the abandoned north loop of the Salduro ditch.
5. Computer simulations of the north lease area show that most of the brine produced is from the immediate region of the production ditches. Drawdowns greater than one foot from the initial water table are generally confined to the area within one mile of the production ditches.

6. The cause of the steep north-south gradients beneath and adjacent to Interstate Highway 80 is a reduction of effective transmissivity normal to the highway. This is undoubtedly a result of roadbed preparation.
7. The flux (flow) of brine from north to south beneath Interstate 80 is calculated by computer simulation to be 360 acre-feet per year, based on Lines' 1976 water level measurements.

Recommendations

There are three areas of the Bonneville salt crust where additional data should be gathered to resolve the important remaining questions:

1. North-south flow under Interstate 80 should be more thoroughly investigated by (a) conducting several pumping tests near Interstate 80, (b) measuring water levels in observation wells on both sides of Interstate 80, (c) measuring water levels in production trenches south of Interstate 80, (d) constructing additional observation wells where necessary, and (e) measuring production from the trenches nearest Interstate 80. This will allow the simulation model to be refined enough for confident prediction of future hydrologic performance.

2. The extent and origin of the small area of diluted brine within the Salduro ditch should be more thoroughly investigated by (a) constructing additional observation wells near the area, and (b) collecting brine samples and measuring water levels in these observation wells.
3. The coefficient of storage in the area of the north lease ditch and the Salduro ditch area should be determined more accurately by conducting one or more long-term pumping tests in each area of interest.

If it is desirable to reduce north-south flow under Interstate 80, the economic and hydrodynamic consequences of the following courses of action should be evaluated:

1. Construction of a "seal" ditch just north of and parallel to Interstate 80,
2. Construction of a clay-filled cutoff barrier just north of and parallel to Interstate 80, and
3. Conversion of the abandoned north loop of the Salduro ditch to a "seal" ditch or cutoff barrier.

DISCUSSION OF THE RESULTS OF TRACKS I, II AND III

Tracks I, II and III attempted to determine the areas influenced by brine production. While each track had its limitations and simplifying assumptions, all three tracks converge on the same conclusion: salt crust disruption, detectable brine dilution, and significant drawdown caused by brine production, are all confined to an area within about one mile of brine production trenches.

Track I indicated that the maximum distance of salt crust disruption or sediment breakthrough is about 1/2 mile from the north lease ditch, but that interpretation of this distance depends on several factors (Listed in Track I). In some places there is no disruption of the extent of the crust, such as in the vicinity of abandoned production ditches.

The main results of Tracks II and III, with respect to are affected by production, are summarized on Figure 49, which shows the extent of significant brine dilution and drawdown. A conclusion of Track II is that the maximum detectable extent of brine dilution may be represented by the 0.25 weight percent contour on the map showing differences in maximum concentration of magnesium chloride, 1967 - 1977 (Plate VII). The 0.25 weight percent contour shown on Figure 49 outlines an area within about a mile of the north lease ditch.